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(54) **BODY FRAMEWORK CONSTRUCTION**

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See application file for complete search history.

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(57) **ABSTRACT**

A body framework construction, includes: a rear seat cross member, extending in a transverse direction of a vehicle, in a rear part of a body in a lower part of a passenger compartment; a dash cross member upper, extending in the transverse direction, in a front part of the passenger compartment; and a backbone, configured into a thin, long shape having a closed cross section, and extending in a longitudinal direction of the vehicle. A front end portion of the backbone is connected to the dash cross member upper via a gusset, and a rear end portion of the backbone is joined to the rear seat cross member. The gusset is deformed more easily than the backbone relative to a force from a front.

7 Claims, 5 Drawing Sheets

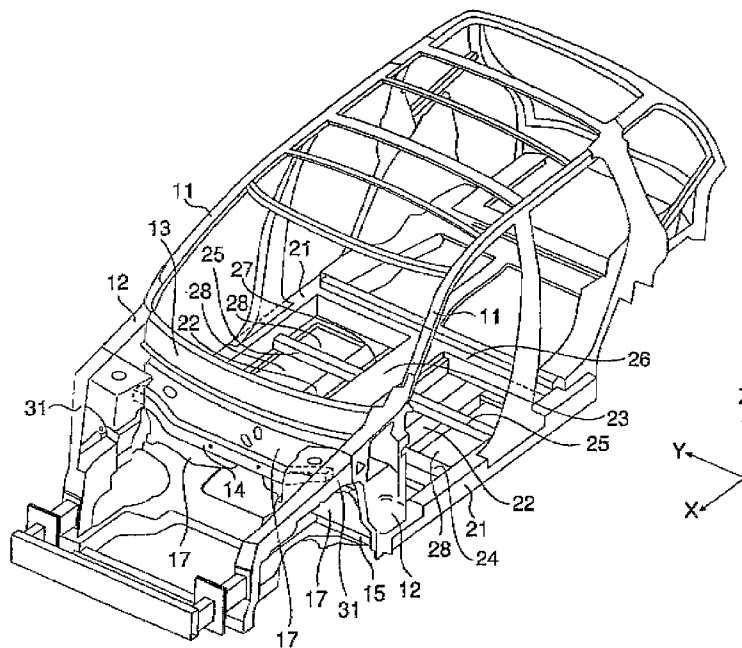
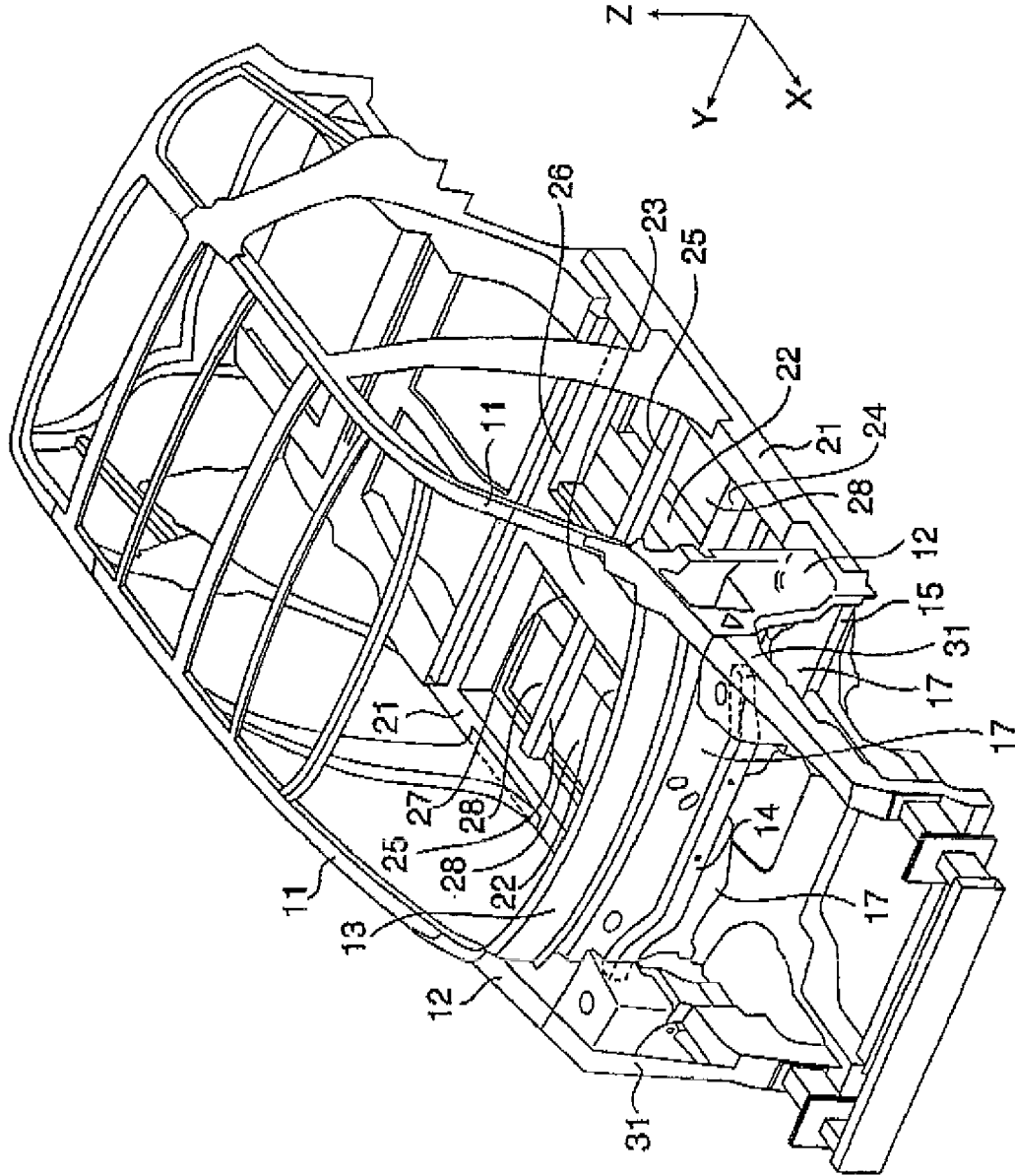


FIG. 1



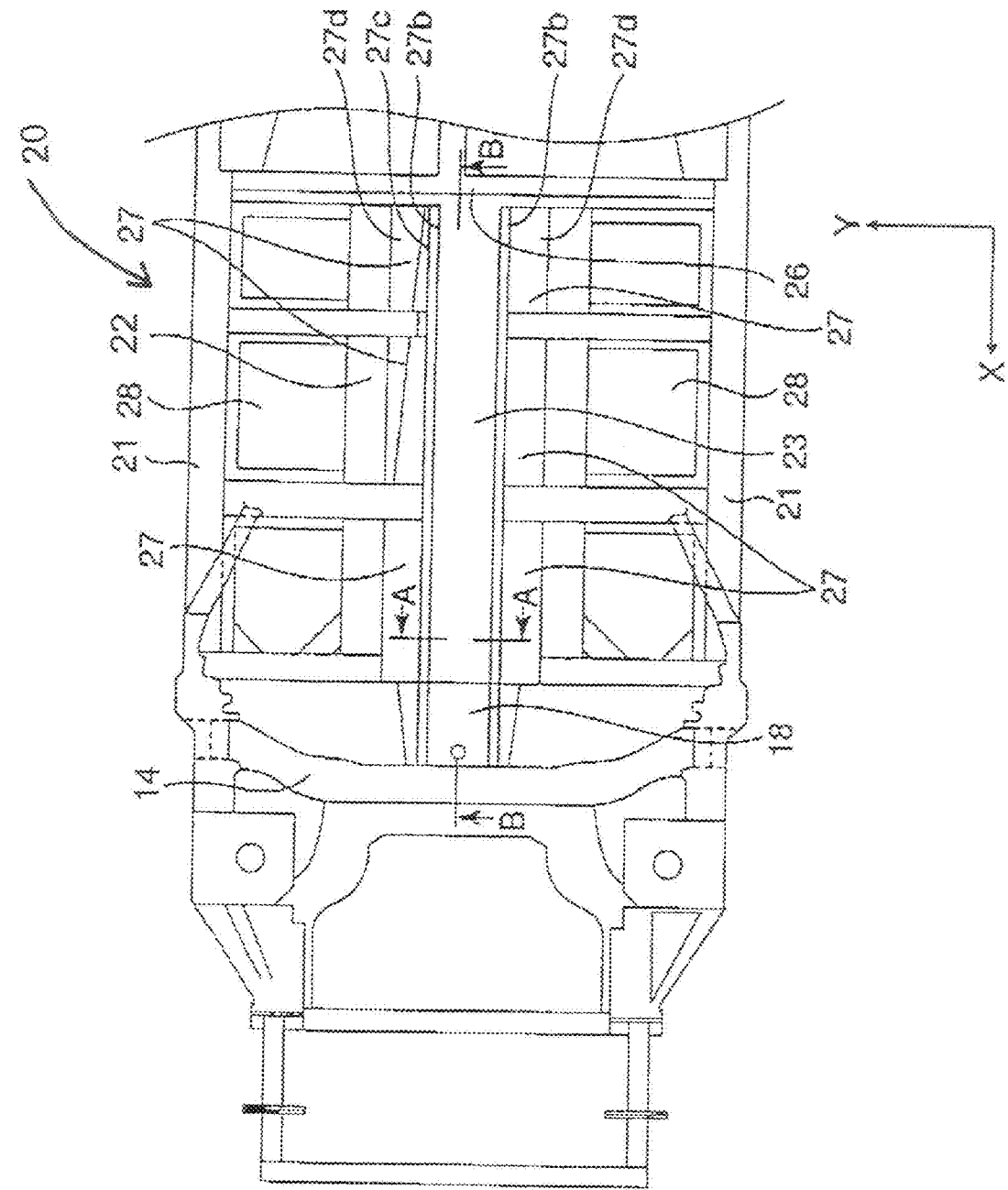


FIG. 2

FIG. 3

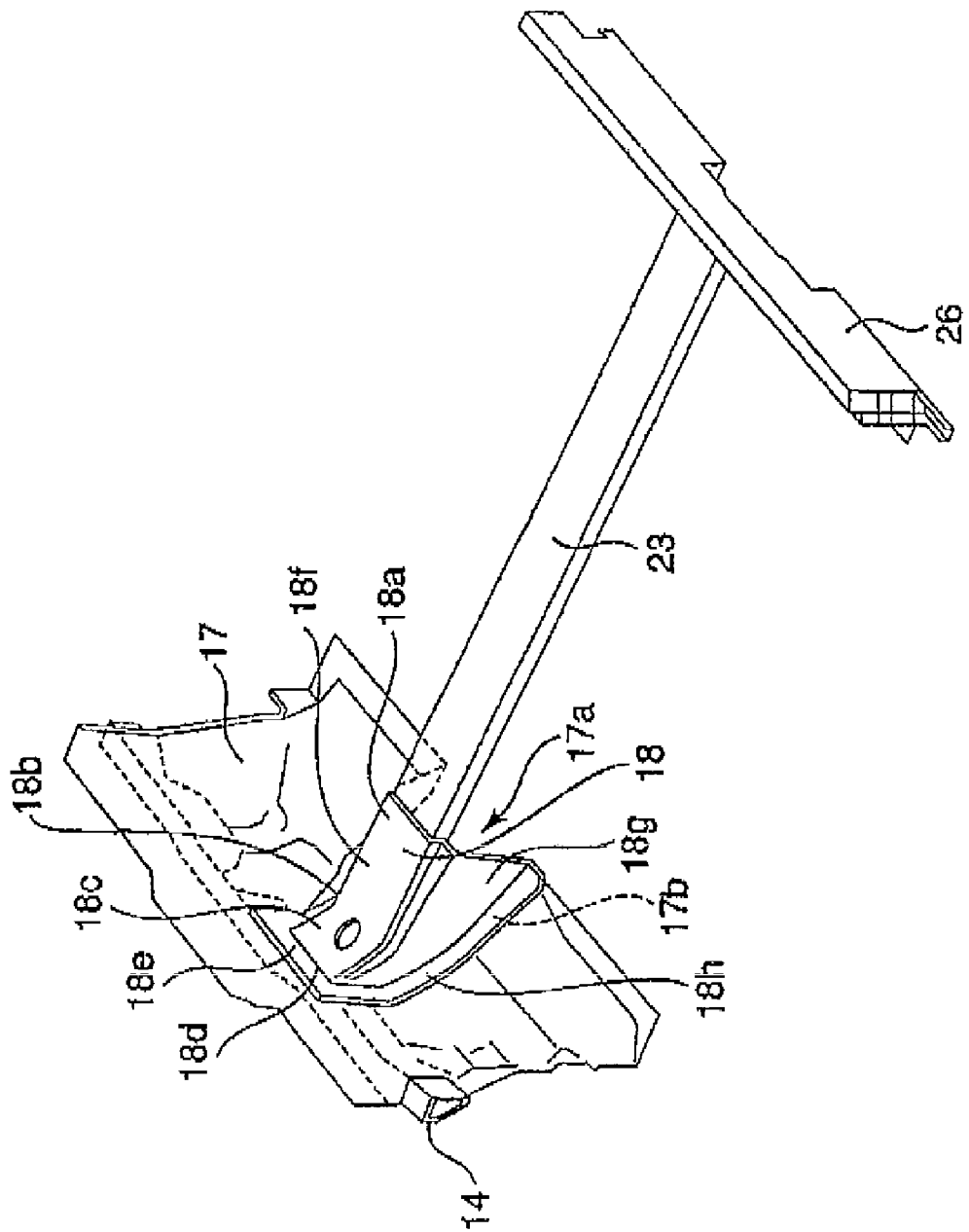


FIG. 4

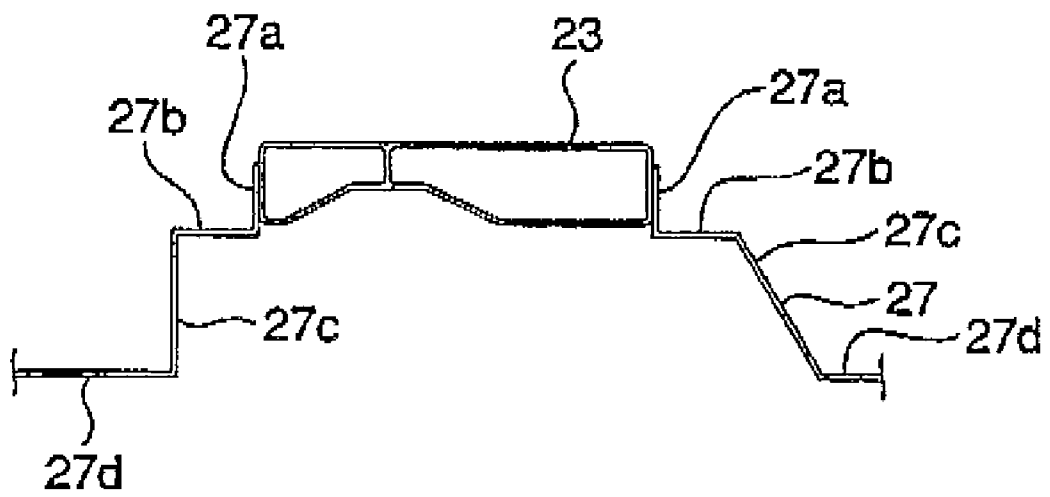
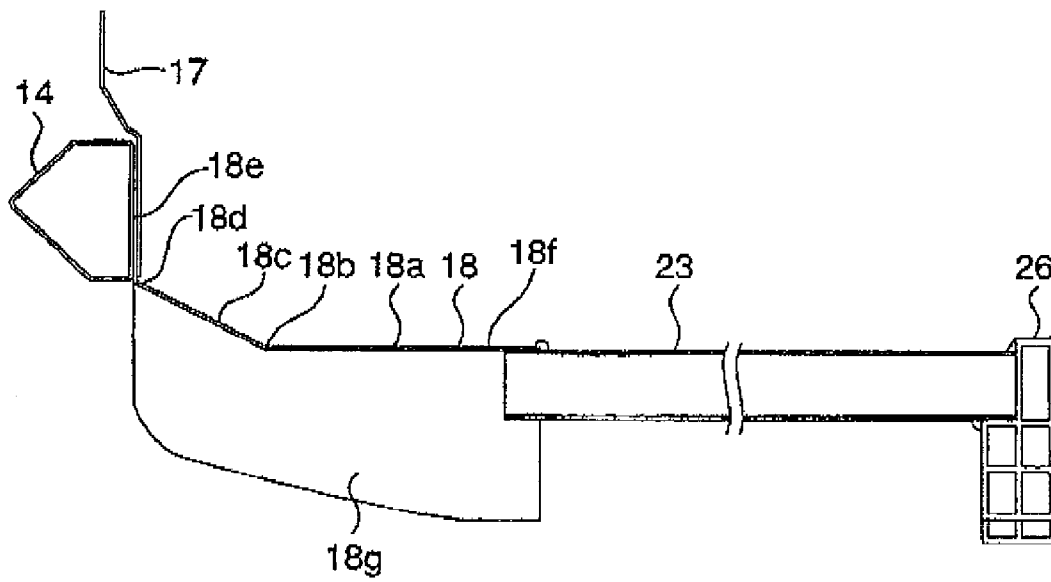


FIG. 5



BODY FRAMEWORK CONSTRUCTION

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a body framework construction which is disposed at a lower part of a passenger compartment of a motor vehicle.

2. Description of the Related Art

As a framework construction of the related art which supports a lower part of a passenger compartment of a motor vehicle, there is a framework construction in which a front end portion of a floor panel which makes up a floor portion of the passenger compartment is joined to a dash panel disposed between an engine compartment and the passenger compartment and a rear end portion is joined to a rear seat cross member which extends in a transverse direction of the vehicle in the rear of a body. A tunnel portion where an exhaust pipe and a drive shaft pass are provided to pass through to the rear of the body is formed in a transversely central portion of a floor panel like the one described above. The tunnel portion has a U-shaped cross section and is configured to project upwards from the floor panel, and a backbone is mounted on an upper surface of the tunnel portion as a reinforcement member in such a manner as to extend in a longitudinal direction. The backbone is made, for example, of a plate-like member and is configured into a thin, long shape having a U-shaped cross section so as to extend along the tunnel portion in a matched fashion. A rear end portion of the backbone is disposed in front of the rear seat cross member, and the tunnel portion is disposed between the rear seat cross member and the backbone. (For example, refer to JP-A-2006-143178.)

In the vehicle body framework construction of the related art that has been described above, however, there have been the following problems inherent therein. Namely, since the floor panel is made up of the single plate member, it is easily subject to torsional deformation, and since the configuration is adopted in which the backbone intended to increase the strength is not directly joined to the rear seat cross member and is provided on only part of the floor panel, it has been difficult to secure high strength.

SUMMARY

It is therefore an object of the invention to provide a body framework construction which can prevent the torsional deformation of the floor panel portion and which can increase the strength of the body.

In order to achieve the object, according to the invention, there is provided a body framework construction, comprising:

a rear seat cross member, extending in a transverse direction of a vehicle, in a rear part of a body in a lower part of a passenger compartment;

a dash cross member upper, extending in the transverse direction, in a front part of the passenger compartment; and
a backbone, configured into a thin, long shape having a closed cross section, and extending in a longitudinal direction of the vehicle, wherein a front end portion of the backbone is connected to the dash cross member upper via a gusset, and a rear end portion of the backbone is joined to the rear seat cross member,

wherein the gusset is deformed more easily than the backbone relative to a force from a front.

The body framework construction may further include: backbone side panels, joined to both sides of the backbone in

the transverse direction, respectively, so as to make up a floor part of the passenger compartment.

A front end portion of the gusset may be connected to the dash cross member upper via a dash panel that is disposed in the front part of the passenger compartment.

The dash cross member upper, the backbone and the rear seat cross member may be extruded members each having a cross-sectional shape which is continuous in the longitudinal direction. The gusset may include a bent plate member, and the gusset may include integrally: a horizontal portion that extends in the longitudinal direction and that is joined to the front end portion of the backbone; a sloping portion that extends obliquely upwards from a front end portion of the horizontal portion; and a vertical portion that extends upwards from a front end portion of the sloping portion and that is joined to the dash cross member.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view showing a body framework construction according to an embodiment of the invention.

FIG. 2 is a plan view showing the same body framework construction.

FIG. 3 is a schematic view showing part of the same body framework construction.

FIG. 4 is a schematic sectional view taken along the line A-A in FIG. 2 which shows part of the same body framework construction.

FIG. 5 is a schematic sectional view taken along the line B-B in FIG. 2 which shows part of the same body framework construction.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Hereinafter, a body framework construction according to a first embodiment of the invention will be described by reference to FIGS. 1 to 5. Note that front (front side), rear (rear side) and left to right width or transverse directions are defined based on a traveling direction of a motor vehicle, and a direction which is directed towards a transverse center of the motor vehicle is defined as an inward direction (inside) whereas a direction expanding from the center of the motor vehicle towards the transverse direction as an outward direction (outside). A direction in which gravity acts is defined as a downward direction (lower side), and a direction opposite to the direction in which gravity acts as an upward direction (upper side). In the figures, arrows X, Y and Z denote three directions which are at right angles to one another, the arrow X denoting the front of a body, the arrow Y denoting a left-hand side of the body as viewed in the transverse direction, the arrow Z denoting the upward direction of the body. In addition, in the following description, transversely symmetrical configurations will not fully be described but will be described only on either of a plurality of constituent members or components as required.

FIGS. 1 and 2 show part of a body framework construction of a motor vehicle (a vehicle) according to the embodiment. A cowl top 13, a dash cross member upper 14 and a dash cross member lower 15 are provided in such a manner as to extend towards the transverse direction between left and right front pillars 12 which are formed to extend downwards from corresponding left and right front pillars 11, respectively. The cowl top 13, the dash cross member upper 14 and the dash cross member upper 15 are provided in upper, middle and lower portions, respectively. The dash cross member upper 14

is disposed further downwards than the cowl top **13** and is curved in such a manner that a transversely central portion thereof lies downwards.

A dash panel **17** is provided between the left and right front pillar lowers **12** in such a manner as to extend transversely and vertically from below the cowl top **13** to reach the dash cross member lower **15** through a rear side of the dash cross member upper **14**. The dash panel **17** is made of a plate-like pressed member of a light alloy casting such as a diecast metal material of aluminum and is disposed in such a manner as to constitute a partition between a passenger compartment and an engine compartment. The dash panel **17** is joined to the dash cross member upper **14** on a front surface thereof and is joined to backbone side panels **27**, which will be described later, at a lower edge thereof. A portion of a transversely central portion of the dash panel **17** which lies further downwards than the dash cross member upper **14** is opened, and a gusset **18**, which will be described later, is joined to a circumferential edge **17b** of the opening **17a**. Note that in a hollow member, an end face means an end face of a circumferential portion which surrounds a hollow portion.

Side sills **21** extend longitudinally from lower portions of the left and right front pillar lowers **12**, respectively. Rear end portions of the side sills **21** are situated in front of rear wheels (not shown). Floor side members **22** are connected to an internal edge portion of the dash cross member lower **15** in positions further transversely inwards than the side sills **21** and extend towards the rear of the body.

A backbone **23** is provided in a transversely central portion in such a manner as to extend in the longitudinal direction of the body. A front end portion **23a** of the backbone **23** is connected to a central portion of the dash panel via the gusset **18**.

As is shown in FIGS. **3** to **5**, the gusset **18** is made by bending a plate member made of a light alloy casting such as a diecast metal material of aluminum and includes integrally a horizontal portion **18a** which extends in the longitudinal direction of the body, a sloping portion **18c** which extends obliquely upwards from a front end portion of the horizontal portion **18a** via a bent portion **18b**, and a vertical portion **18e** which extends further vertically upwards from an upper front end portion of the sloping portion **18c** via a bent portion **18d**. The horizontal portion **18a** and the sloping portion **18c** each have an upper wall portion **18f** and left and right side wall portions **18g** and are each configured to have a U-shaped cross section in such a manner as to surround upper surface and side surfaces of the backbone **23**. The vertical portion **18e** is configured into a plate-like shape which extends upwards and in the transverse direction. This plate-like vertical portion **18e** is held between a front surface portion of the circumferential edge **17b** of the opening **17a** in the dash panel **17** and a rear surface of the dash cross member upper **14**, and is fixed to the dash panel **17** and the dash cross member upper **14**, respectively. Here, the gusset **18** (the vertical portion **18e**) may be fixed to the dash cross member upper **14** via the dash panel **17**. Extending portions **18h**, which extend from lower edges of the left and right side wall portions **18g** of the horizontal portion **18a** and the sloping portion **18c**, are joined, respectively, to left and right members of the circumferential edge **17b** of the opening **17a** in the dash panel **17**. The upper wall portion **18f** of the horizontal portion **18a** is fixed to an upper surface of the backbone **23** at the front end portion thereof. A lower surface of the horizontal portion **18a** and the upper surface of the backbone **23** are joined together by means of welding at welding portions shown in the figures. When a load of a certain magnitude or larger is applied thereto from the front via the plate-like vertical portion **18e**, the

gusset **18**, which is configured as has been describe above, can be bent to be deformed by the bent portions **18b**, **18d**, and therefore, when a large force is inputted to the vehicle due to it being involved in a frontal collision, the gusset **18** has a function to absorb impact energy by being so deformed so as to mitigate impact that would otherwise be transmitted to the passenger compartment via the backbone **23**.

Various cross members **24**, **25**, **26** are provided between the left and right side sills **21** in such a manner as to extend in the transverse direction. Transversely outward end faces of the dash cross member lower **15** and the various cross members **24**, **25**, **26** are joined to internal wall surfaces **21a** of the left and right side sills **21** by means of welding, and so on, respectively. Left and right end portions of the rear seat cross member **26** in the various cross members which is disposed in front of the rear wheels is connected to the side sills **21**. End portions of the floor side members **22** and the backbone **23** are joined to the rear seat cross member **26**. In addition, internal end faces of the cross members **24**, **25**, which are provided, respectively, at both ends in the transverse direction, are connected to the backbone **21** via the backbone side panels **27**, which will be described later. Namely, as is shown in FIG. **4**, an H-shaped framework construction is formed by the dash cross member upper **14**, the gusset **1a**, the backbone **23** and the rear seat cross member **26** being joined to each other.

The backbone side panels **27**, which are made up of a light diecast metal such as a diecast material of aluminum, are provided between both left and right side surfaces and the floor side members **22**, respectively. The backbone side panels **27** each include a mounting portion **27a** which extends vertically to be fixed to either a left or right side surface of the backbone **23**, a horizontally extending portion **27b** which extends horizontally from a lower edge of the mounting portion **27a**, an elevated surface portion **27c** which extends downwards from a transversely outward edge portion of the horizontally extending portion **27b** to the same level as a floor framework portion **20**, and a horizontal panel portion **27d** which is bent from a lower edge of the elevated surface portion **27c** via a bent portion so as to extend horizontally towards the transversely outward direction. Transversely outward end portions of the horizontal panel portions **27** are joined to the floor side members **22**, respectively.

Furthermore, floor panel members **28** are provided between the side sills and the floor side members **22**, respectively.

The side sills **21**, the floor side members **22** and the backbone **23**, which extend in the longitudinal direction, and the dash cross member lower **15** and the various cross members **24** to **26**, which extend transversely, are made to intersect each other so as to be combined into a ladder configuration to make up the floor framework portion **20**. A floor part of the passenger compartment is made up of the floor framework portion **20**, the backbone side panels **27** which are joined to the floor framework portion **20** and the floor panel members **28**.

The various frame members **13** to **15**, **21** to **26** which make up the floor framework portion **20** are made up of extruded members which are formed of a light diecast metal such as an aluminum alloy into thin, long shapes, and cross sections thereof are configured into, for example, polygonal configurations having a hollow portion which are continuous in the longitudinal direction with certain closed cross sections maintained therealong. The curvedly shaped cowl top **13** and dash cross member upper **14** are so made by being bent to be deformed over a range where the cross sectional shapes thereof are maintained constant continuously therealong.

5

In the framework construction **1** that is configured as has been described heretofore, when a large frontal force is applied to the dash cross member upper **14** from the front part of the body, the gusset **18** is deformed to absorb impact produced then. In addition, the rigidity is increased by the backbone **23** which is configured by the closed section.

The body framework construction **1** according to the embodiment provides the following advantages. Namely, the rigidity of the body is increased by joining together the rear seat cross member **26** of the closed cross section and the backbone **23** of the closed cross section. In addition, the occurrence of distortional deformation can be prevented more than the body framework construction in which the whole of a floor part of the body is formed integrally by configuring the floor part by joining the backbone side panels **27** to the backbone **23** which is made up of the thin, long shape having the closed cross section. Furthermore, when a large frontal force is inputted into the vehicle due to it being involved in a frontal collision, impact produced by such a collision can be absorbed by interposing the deformable gusset **18**. Consequently, impact can be mitigated which would otherwise be transmitted to the passenger compartment.

In carrying out the invention, the constituent elements of the invention can be modified variously without departing from the spirit and scope of the invention, and specifically, the cross sectional shapes of the various frame members and the shapes of the panel members can be so modified.

What is claimed is:

1. A body framework construction, comprising:
 - a rear seat cross member, extending in a transverse direction of a vehicle, in a rear part of a body in a lower part of a passenger compartment;
 - a dash cross member upper, extending in the transverse direction, in a front part of the passenger compartment; and
 - a backbone, configured into a thin, long shape having a closed cross section, and extending in a longitudinal direction of the vehicle, wherein a front end portion of the backbone is connected to the dash cross member upper via a gusset, and a rear end portion of the backbone is joined to the rear seat cross member, wherein rigidity of the backbone is greater than rigidity of the gusset so that the gusset is deformed more easily than the backbone relative to a force from a front of the vehicle.
2. The body framework construction according to claim 1, further comprising:
 - backbone side panels, joined to both sides of the backbone in the transverse direction, respectively, so as to make up a floor part of the passenger compartment.
3. The body framework construction according to claim 1, wherein
 - a front end portion of the gusset is connected to the dash cross member upper via a dash panel that is disposed in the front part of the passenger compartment.
4. The body framework construction according to claim 1, wherein
 - the dash cross member upper, the backbone and the rear seat cross member are extruded members each having a cross-sectional shape which is continuous in the longitudinal direction, and

6

the gusset includes a bent plate member, and the gusset includes integrally: a horizontal portion that extends in the longitudinal direction and that is joined to the front end portion of the backbone; a sloping portion that extends obliquely upwards from a front end portion of the horizontal portion; and a vertical portion that extends upwards from a front end portion of the sloping portion and that is joined to the dash cross member.

5. A body framework construction, comprising:
 - a rear seat cross member, extending in a transverse direction of a vehicle, in a rear part of a body in a lower part of a passenger compartment;
 - a dash cross member upper, extending in the transverse direction, in a front part of the passenger compartment;
 - a backbone, configured into a thin, long shape having a closed cross section, and extending in a longitudinal direction of the vehicle, wherein a front end portion of the backbone is connected to the dash cross member upper via a gusset, and a rear end portion of the backbone is joined to the rear seat cross member; and
 - backbone side panels, joined to both sides of the backbone in the transverse direction, respectively, so as to make up a floor part of the passenger compartment, wherein the gusset is deformed more easily than the backbone relative to a force from a front of the vehicle.

6. A body framework construction, comprising:
 - a rear seat cross member, extending in a transverse direction of a vehicle, in a rear part of a body in a lower part of a passenger compartment;
 - a dash cross member upper, extending in the transverse direction, in a front part of the passenger compartment; and
 - a backbone, configured into a thin, long shape having a closed cross section, and extending in a longitudinal direction of the vehicle, wherein a front end portion of the backbone is connected to the dash cross member upper via a gusset, and a rear end portion of the backbone is joined to the rear seat cross member, wherein the gusset is deformed more easily than the backbone relative to a force from a front of the vehicle, and wherein
 - the dash cross member upper, the backbone and the rear seat cross member are extruded members each having a cross-sectional shape which is continuous in the longitudinal direction, and
 - the gusset includes a bent plate member, and the gusset includes integrally: a horizontal portion that extends in the longitudinal direction and that is joined to the front end portion of the backbone; a sloping portion that extends obliquely upwards from a front end portion of the horizontal portion; and a vertical portion that extends upwards from a front end portion of the sloping portion and that is joined to the dash cross member.
7. The body framework construction according to claim 1, wherein
 - the backbone extends in the longitudinal direction of the vehicle at a center of the vehicle.

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